

**Amendments to the Claims:**

The following claims will replace all prior versions of the claims in this application (in the unlikely event that no claims follow herein, the previously pending claims will remain):

1. (Original) A method of producing a nanoporous open-cell silica gel having a plurality of open channels within the gel structure and silanol (Si-OH) groups on the surface comprising
  - (a) gelling a silica sol solution to form a wet silica gel; and
  - (b) maintaining the silica gel at a temperature in the range of from about 40 °C to about 80 °C in a moist state under conditions to obtain a wet nanoporous silica gel having a plurality of open channels within the gel structure and silanol (Si-OH) groups on the surface; and
  - (c) reacting a ligand group with the surface silanol groups to introduce a functionalized group effective for selective adsorption or reaction catalysis.
  
2. (Original) A method for producing a chemically surface modified silica gel comprising:
  - (a) gelling a silica sol solution to form a wet silica gel;
  - (b) maintaining the silica gel at a temperature in the range of from about 40 to about 80 °C in a moist state to obtain a wet nanoporous silica gel having a plurality of open channels within the gel structure and silanol (Si-OH) groups on the surface thereof; and
  - (c) reacting the wet nanoporous silica gel with a reactive ligand introducing compound in an aqueous alcoholic medium under an inert atmosphere and at an elevated temperature within the range of from 40° C to about 80° C to cause the ligand introducing compound to condense and react with said surface

silanol groups to thereby obtain said chemically surface modified silica gel;  
and

(d) optionally, drying the chemically surface modified silica gel.

3. (Original) A method for producing a chemically surface modified silica gel comprising the steps of:

- (a) reacting a silica precursor with a reactive ligand introducing compound in an aqueous alcoholic medium under an inert atmosphere and at an elevated temperature within the range of from 40° C to 80° C to cause the ligand introducing compound to condense and react with said silanol groups before gelation and subsequently adjusting the pH value of the solution to induce gelation, to thereby obtain said chemically surface modified silica gel; and
- (b) optionally, drying the chemically surface modified silica gel.

4. (Original) A chemically surface modified silica gel produced by the method of claim 1.

5. (Original) A chemically surface modified silica gel produced by the method of claim 2.

6. (Original) The chemically surface modified silica gel according to claim 5 wherein the ligand introducing compound is 3-mercaptopropyltrialkoxysilane.

7. (Original) A chemically surface modified silica gel produced by the method of claim 3.

8. (Original) The chemically surface modified silica gel according to claim 7 wherein the ligand introducing compound is 3-mercaptopropyltrialkoxysilane.
9. (Original) A method of removing metallic impurities from a liquid which comprises contacting the liquid with the chemically surface modified silica gel according to any one of claims 1-8.
10. (Original) A method of concentrating metallic content in a liquid which comprises contacting the liquid with the chemically surface modified silica gel of any one of claims 1-8.
11. (Original) A method of separating two or more metallic impurities from a solution of the mixture of metallic impurities which comprises passing the solution mixture through a column packed with the chemically surface modified silica gel of any one of claims 1-8.
12. (Original) A method of recovering metal from a low-concentration feed solution which comprises contacting the feed solution with the chemically surface modified silica gel of any one of claims 1-8.
13. (Original) A method of producing a nanoporous open-cell silica gel having a plurality of open channels within the gel structure and silanol (Si-OH) groups on the surface comprising
  - (a) gelling a silica sol solution to form a wet silica gel; and
  - (b) maintaining the silica gel at a temperature in the range of from about 40 to about 80 °C in a moist state to obtain a wet nanoporous silica gel having a plurality of open channels within the gel structure and silanol (Si-OH) groups on the surface.

14. (Original) A method for preparing a chemically surface modified silica gel effective for adsorbing a target specie from a liquid containing said target specie suspended or dissolved therein, said method comprising

- (1) selecting a ligand molecule having a first functional group at one end thereof reactive with the silanol groups of silica and a second functional group at an opposed end thereof, said second functional group strongly binding to said target specie, as determined by at least one of bond energy between the second functional group and target specie or solubility product constant,  $K_{sp}$ ; and
- (2) reacting wet silica gel with the selected ligand in a hydrophilic co-solvent.

15. (Original) A chemically surface modified silica gel produced by the method of claim 14 which further comprises

- (a) gelling a silica sol solution to form a wet silica gel;
- (b) maintaining the silica gel at a temperature in the range of from about 40 to about 80 °C in a moist state to obtain a wet nanoporous silica gel having a plurality of open channels within the gel structure and silanol (Si-OH) groups on the surface thereof; and
- (c) reacting the wet nanoporous silica gel with a reactive ligand introducing compound in an aqueous alcoholic medium under an inert atmosphere and at an elevated temperature within the range of from 40 °C to 80 °C to cause the ligand introducing compound to condense and react with said surface silanol groups to thereby obtain said chemically surface modified silica gel.

16. (Original) A chemically surface modified silica gel produced by the method of claim 14 which further comprises

reacting a silica precursor with said selected ligand molecule in said hydrophilic co-solvent under an inert atmosphere and at an elevated temperature of from 40°C to 80°C to cause the selected ligand molecule to condense and react with said silanol groups before gelation and subsequently adjusting the pH value of the solution to induce gelation.

17. (Original) A method of separating a target specie from a ligand containing said target specie which comprises contacting the liquid with the chemically surface modified silica gel of claim 15 or claim 16.

18. (Original) A chemically surface modified silica gel according to claim 15 or claim 16 wherein said second functional group strongly binds to an organic target specie.

19. (Original) A method for removing oil or other organic chemical contaminant spilled on the surface of a body of water, comprising contacting the contaminated surface of said body of water with the chemically surface modified silica gel according to claim 18 whereby the oil or other organic chemical contaminant at least substantially adsorbed by said gel and thereafter removing the gel from the surface of said body of water.

20. (Original) A chemically surface modified amorphous silica gel adsorbent comprising

- (i) bimodal pore size distribution of pores having pore diameters of about 10 nanometers and about 10 microns;
- (ii) ligand loading of about 7.5 mmole ligand per gram silica gel; and
- (iii) bulk density in the range of from about 0.2 to about 0.25 g/ml.

21. (Currently amended) The silica gel adsorbent according to claim ~~18~~ 20 wherein said ligand comprises 3-mercaptopropyltrialkoxysilane.

22. (New) A method of producing a chemically surface modified silica gel with a high ligand loading of up to about 7.5 mmole ligand per gram of silica gel and open pore structure comprising

- (a) gelling a silica sol solution to form a wet silica gel; and
- (b) maintaining the silica gel at a temperature in the range of from about 40 °C to about 80 °C in a moist state to obtain a wet nanoporous silica gel having a plurality of open channels within the gel structure and silanol (Si-OH) groups on the surface thereof; and
- (c) reacting the silica gel precursor in step (a) prior to or during gelling, or reacting the wet nanoporous silica gel in step (b) after gelling with a functional ligand group or a reactive ligand introducing compound, to introduce a functionalized group, in a mixed aqueous solvent medium under an inert atmosphere and an elevated temperature within the range of from about 40 °C to about 80 °C, to cause the functional ligand group or the reactive ligand introducing compound to condense and react with the surface silanol groups to thereby obtain a chemically surface modified silica gel; and, optionally
- (d) drying the chemically surface modified silica gel having the high ligand loading and open channel pore structure with minimizing the formation of crosslinking of the surface silanol groups during optional aging and drying procedures.

23. (New) A method according to claim 22, wherein the mixed aqueous solvent medium is an aqueous alcoholic medium.

24. (New) A method according to claim 23, wherein the alcohol is ethanol.

25. (New) A method according to claim 22, which further comprises adjusting the pH value of the mixture prior to gelling to induce gellation.
26. (New) A method to claim 22, wherein the ligand or ligand introducing compound has a first functional group at one end thereof reactive with the silanol groups of silica and a second functional group at an opposed end thereof, said second functional group strongly binding to a target specie for adsorbing the target specie from a liquid containing said target specie suspended or dissolved therein, as determined by at least one of bond energy between the second functional group and target specie or solubility product constant,  $K_{sp}$ .
27. (New) A chemically surface modified silica gel obtained by the method according to claim 22.
28. (New) A chemically surface modified silica gel according to claim 27, having a ligand loading of about 7.5 mmole ligand per gram silica gel.
29. (New) A method according to claim 13, further comprising introducing functional groups into the nanoporous open-cell silica gel having a plurality of open channels within the gel structure and silanol (Si-OH) groups on the surface to form a chemically surface modified silica gel, by
- (c) reacting a ligand group with the surface silanol groups to introduce a functionalized group effective for selective adsorption or reaction catalysis; or,
  - (d) first reacting a silica precursor comprising silanol groups with a reactive ligand introducing compound in an aqueous alcoholic medium under an inert atmosphere and at an elevated temperature within the range of from 40° C to 80° C to cause the ligand introducing compound to condense and react with said silanol groups before gelation and subsequently adjusting the pH value of

the solution to induce gelation, thereby obtaining said chemically surface modified silica gel; and

- (e) optionally, drying the chemically surface modified silica gel.